ground), with bran and some preparation of oil-meal. The proportions varied from time to time, but was always the same for all the animals. No molasses was used, nor condiments of any sort.

The coarse fodder was principally mixed hay (timothy and clover), relieved by roots (mangels, turnips, etc.), corn-ensilage, cut grass or corn, and in the early part by pasture. During the first summer they were on pasture a large part of the time for about four months, too long for their best good. The last summer they were out from May 17 to June 6, and rested from grain. This resulted in a temporary loss of weight, but a real advantage to the steers.

The results of this experiment seem strongly to confirm the following: —

1. The amount of food consumed is no index of the amount of gain it will produce; that is, to its profitable use and conversion into meat.

2. Neither is the total gain secured, nor the rate of gain, a sure guide to the economical use of food by the animal.

3. Large gains are not necessarily economical ones, nor medium ones necessarily costly.

4. Age is the all-controlling circumstance that decides the rate of gain. The ration necessary to sustain the gain increases with age in about the same proportion as the weight of the animal, but the gain remains absolutely about the same.

5. That "baby beef" is not inconsistent with high quality.

6. That nervousness is not necessarily a sign of a bad feeder.

7. That great development in size is not a necessary condition to profitable feeding nor to quality.

8. That the "type" of an animal has much to do with his ability to use food to good advantage in the production of meat. In this sense there is a distinction and a difference between the breeds for beef purposes.

9. Those nearest the "dairy type" made less gain to the food consumed, and it consisted more largely of fat on and about the internal organs. This type was also characterized by coarser extremities; a longer, flatter rib; more shrinkage of meat in cooling; and a higher percentage of cheap parts.

10. As between the beef breeds, Mr. Davenport thinks no one can here suggest marked differences that cannot be sufficiently explained on other grounds. As in all experiments of this kind, greater differences are noticeable within the breeds than between them. The two Herefords are in this experiment nearly at extremes in every thing but type, and in that respect as far apart as is allowable among Herefords. Aside from the Holsteins, no two animals of the lot differed more than did the two Herefords. Very close upon them came the two Galloways, with marked differences in build.

11. Knowing these animals as he did, Mr. Davenport thinks he may safely say, that as they, irrespective of breed, approached a certain stocky, blocky form, designated as the "meat type," in the same degree they proved good feeders and economical consumers of food within a reasonable age. On the other hand, as they approached the coarser or more loosely built organization, betraying a circulation more largely internal and less diffused, in about the same proportions were they less profitable consumers of food for meat purposes, and turned out a less desirable carcass for the block. If this be true, it is a question of type rather than of breed; and that breed that affords the largest proportion in members of this type is, all things considered, the best, if any one thinks he knows which breed or breeds that may be.

In saying this, Mr. Davenport believes that he only follows the teachings of this and all other experiments. Nor does it work any injustice to other types selected for and excelling in other special lines. All will make some beef. Only a few will make the best or the cheapest. The strong teaching in this is, that moderate gains are not inconsistent with profit, nor lack of age inconsistent with quality.

An experiment of this kind is attended with much expense and labor. Many a careful thought and laborious hour go to secure what passes into a few tables. If only it shall assist a little in the establishment of knowledge and of truth, and not at all in fostering an error, then every one will be well paid.

OUTLINE OF THE HISTORY OF COMMERCIAL FERTILIZERS.[1]

THE history of commercial fertilizers practically dates back to the time when bones were first applied to the soil, and their value as a fertilizer was recognized. Fertilizing with bones was first practised in England. Probably the first instance of their extensive application was in the case of the farmers living near Sheffield, England, who applied to the land the bone and ivory clippings which were waste products of the knife and button factories of Sheffield. These clippings amounted to about eight hundred tons a year, and were regarded, until about a century ago, as a nuisance, the disposal of which was a serious problem to the manufacturers.

In 1774 the agricultural use of bones was first publicly recommended by Hunter, and successful experiments were made with bone-dust.

About 1814, Alexander von Humboldt called public attention to the use of guano as a fertilizer, which he had seen used by the natives of Peru.

About 1817 the first super-phosphate is believed to have been made by Sir James Murray.

It was not until after 1820 that the use of phosphates assumed any great commercial or agricultural importance, and not even then was it appreciated what gave bones their value as fertilizers.

About 1830, Peruvian guano began to be imported into Europe as a fertilizer, and, a few years after, into the United States, especially at the South.

About 1840, Liebig published the results of his researches, and suggested that plants must obtain materials for their growth from the soil as well as from the air and water, which alone were previously supposed to furnish plant-food, and hence that the proper life of a plant can be benefited by furnishing those elements that are necessary. It was shown that the phosphate of lime in bones gave them their value, and that by dissolving bones with sulphuric acid they were made much more effective. The demand for bones then outran the supply. Other sources were looked for, and in 1843 a new source of phosphate of lime was found in Spain, consisting of a rock which contained considerable amounts of phosphoric acid. On trial, this rock was found to be a substitute for bone.

In the United States, farmers first used bones about 1790. The first bone-mill was built about 1830, and super-phosphates were first used in 1851. The discovery of the so-called South Carolina rock was a great boon to those using commercial fertilizers, as this was found to take the place of bones.

The investigations based upon Liebig's theory showed that other elements in addition to phosphorus must be used to secure the best results, and gradually commercial fertilizers containing other elements came to be manufactured and offered for sale.

[1] From Bulletin No. 26 of the New York Agricultural Experiment Station.

LETTERS TO THE EDITOR.

Ohio State University.

BY the recent passage of the Hysell Bill in the Ohio Legislature, which levies a tax of one-twentieth of a mill on every dollar of taxable property in the State, some attention has been turned toward this institution.

The institution was founded in 1862. At that time the State received from the United States 630,000 acres of land; and now the fund from the sale of this land is nearly $540,000, and yields an income of over $32,000.

The legislature has made liberal appropriations from time to time, but the trustees and faculty have hesitated to lay out very extensive plans, for this support was not entirely sure; but, now that this can be depended upon, plans for increasing the facilities of the institution will be carefully considered. The tax will bring the university $90,000 each year, which, together with what it receives from other sources, places Ohio on her feet in the educational race; and she will soon be in advance of her weaker sisters,